Successes and Challenges in Satellite Remote Sensing of Trace Gases for Air Quality Applications

Folkert Boersma

Harvard University

Randall Martin

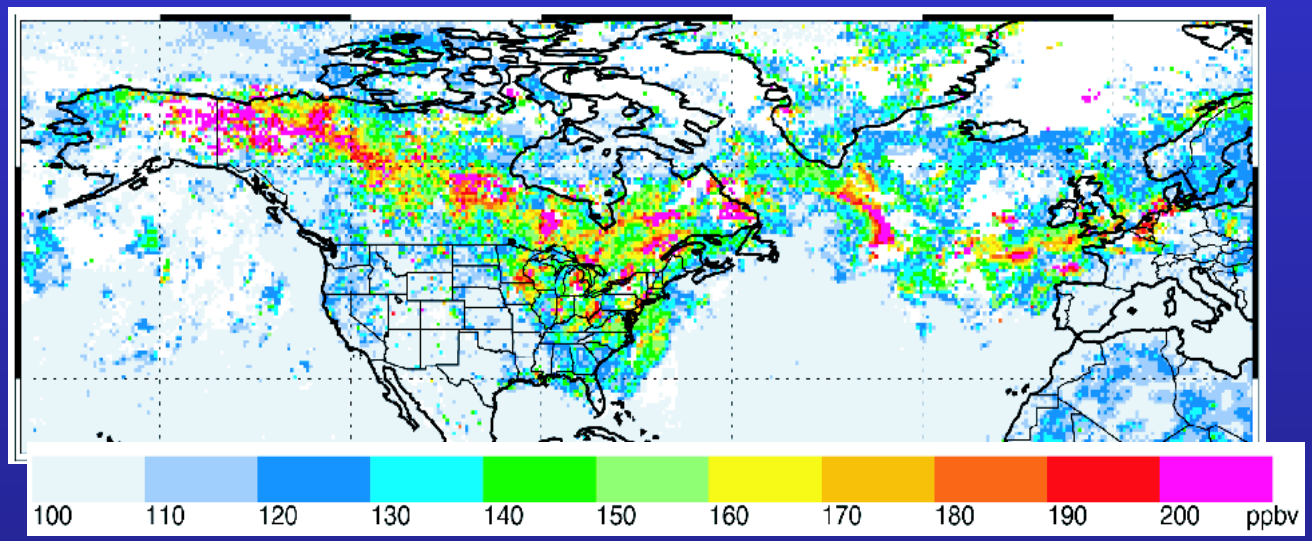
Dalhousie University

Harvard-Smithsonian Center for Astrophysics

Successes

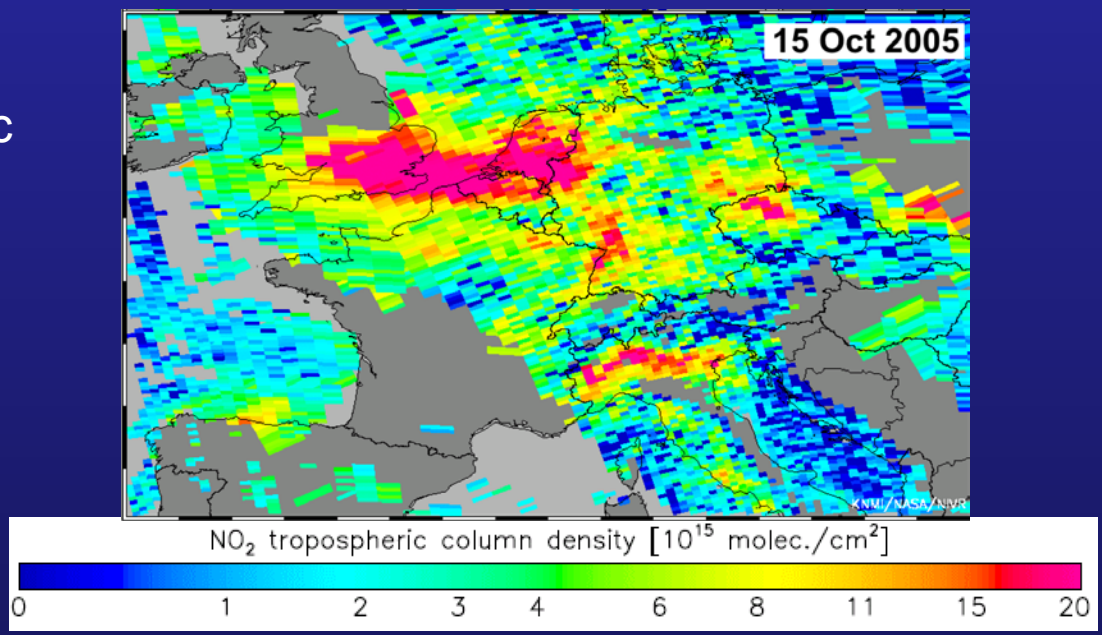
Long-Range Transport of Pollutants

CO from MOPITT
for July 2004
Pfister et al., 2006



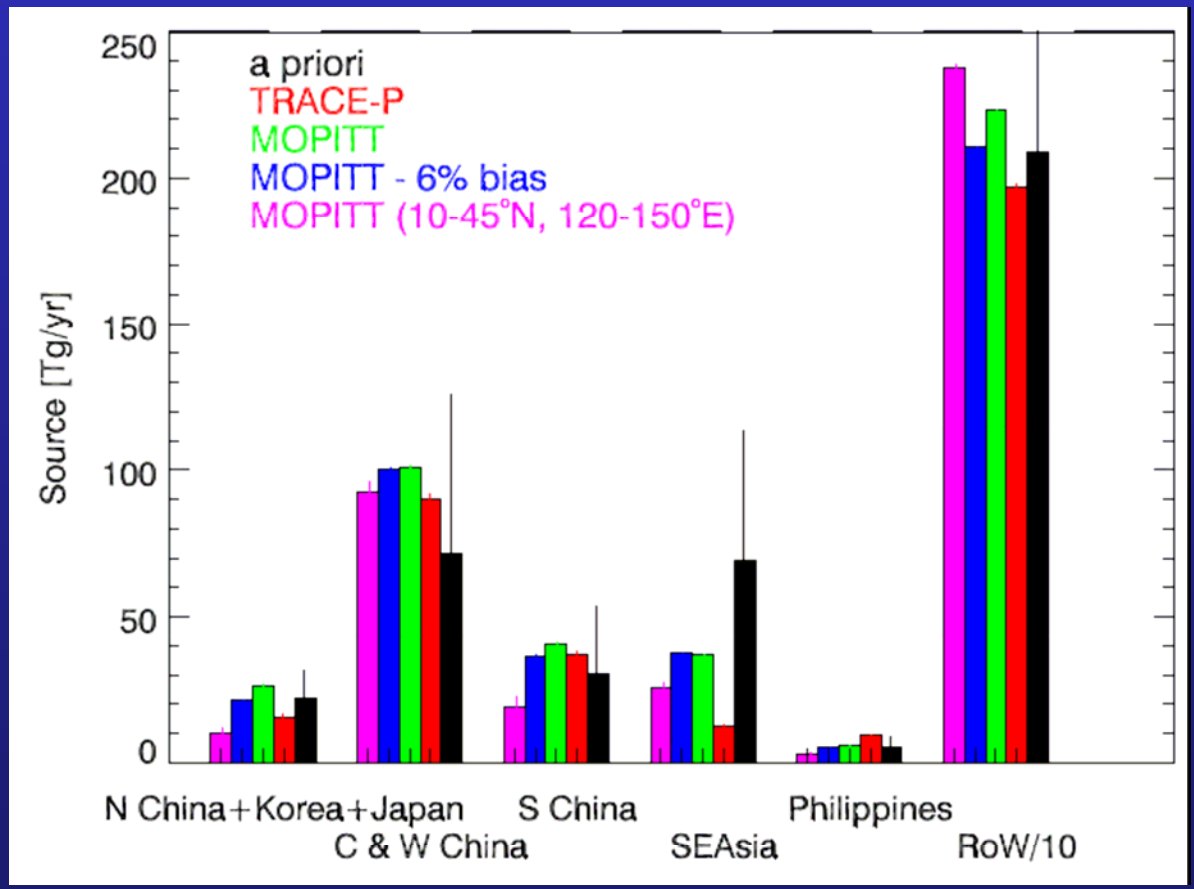
OMI Tropospheric
NO_2 column

Eskes et al.

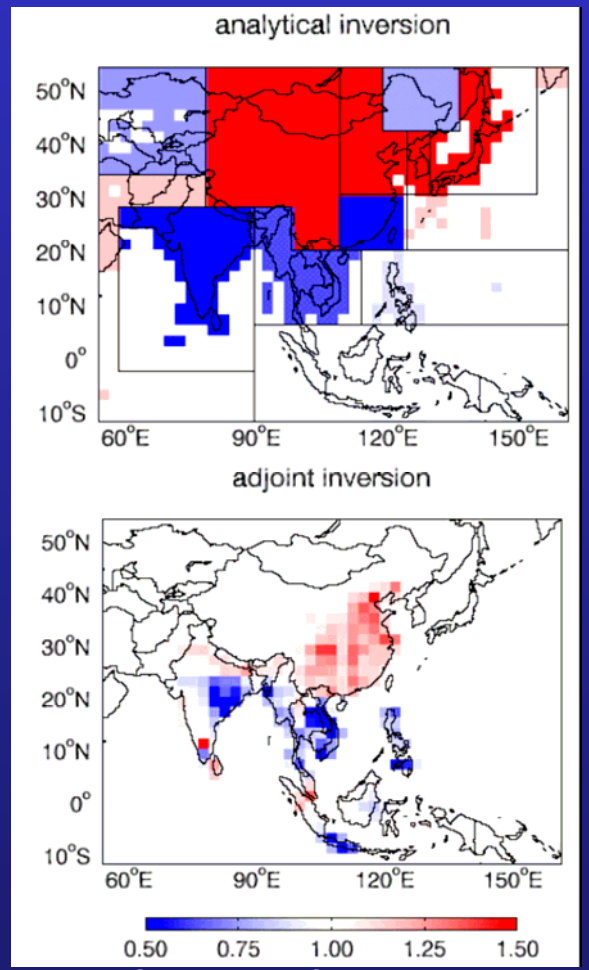


Source Strengths Inferred from MOPITT CO Observations

Adjustments in CO inventories



Heald et al., 2004

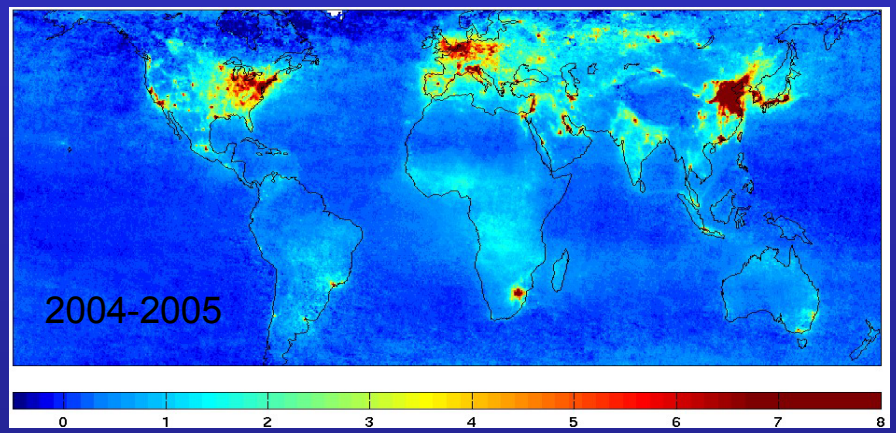


Correction factors to *a priori* Asian CO sources for February – April 2001

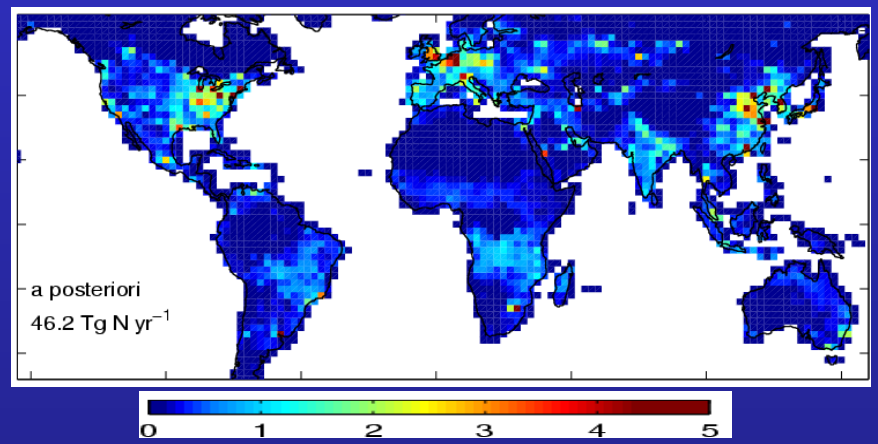
Kopacz et al., submitted

Top-Down Constraints on NOx Emissions

Inverse Modeling

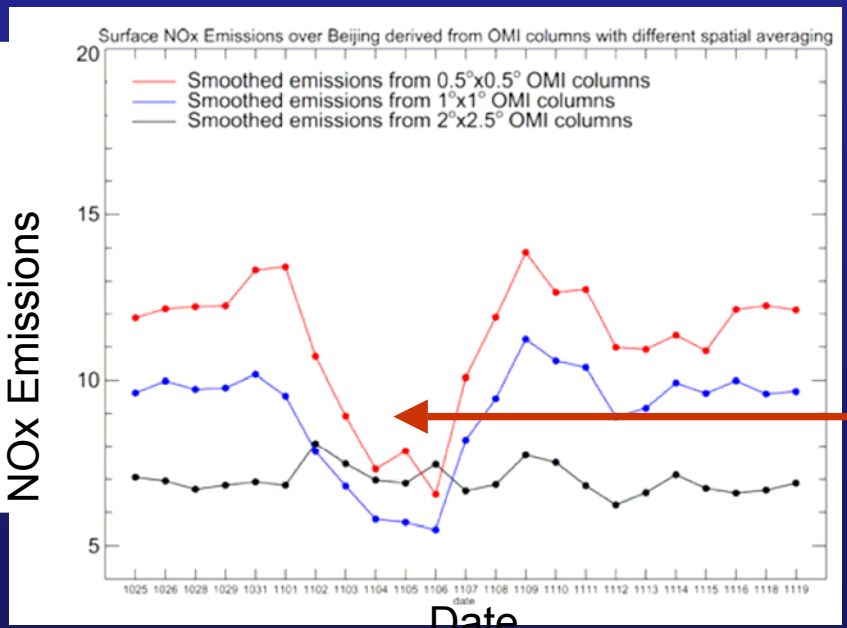


SCIAMACHY Tropospheric NO_2 (10^{15} molec cm^{-2})



NO_x emissions (10^{11} atoms N cm^{-2} s^{-1})

Martin et al., 2006

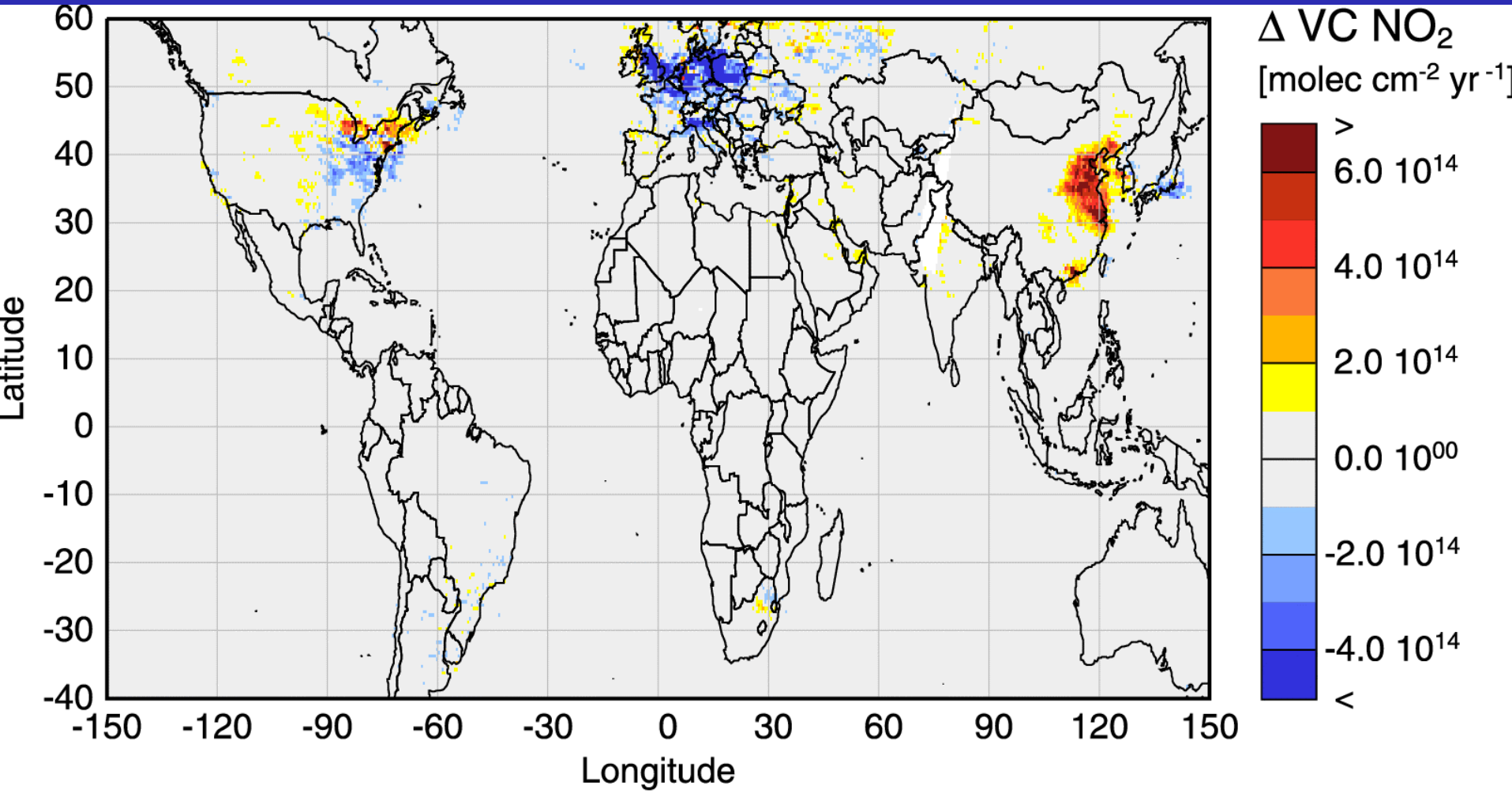


Reduction in NOx Emissions During Traffic Restrictions Observed by OMI

Sino-African Summit in Beijing

Wang et al., 2007

NO_2 Trends Inferred from GOME (1995-2002)

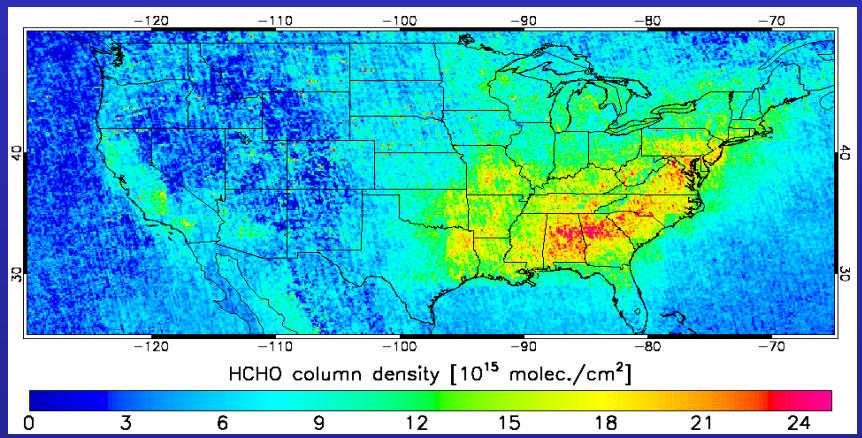


Richter et al., 2005

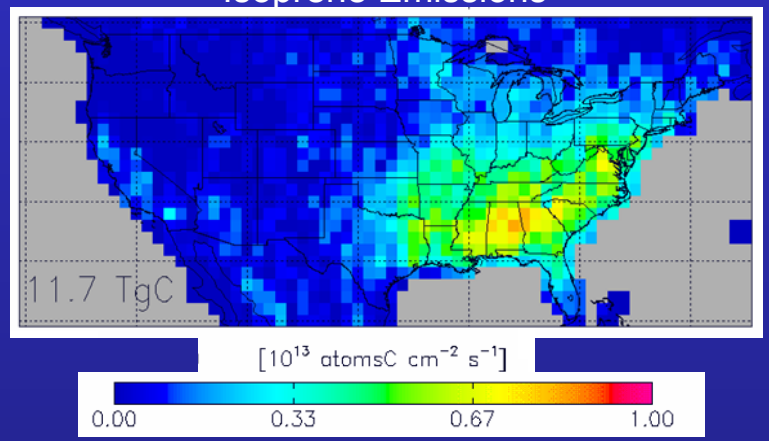
Top-Down Constraints on Isoprene Emissions

Inverse Modeling

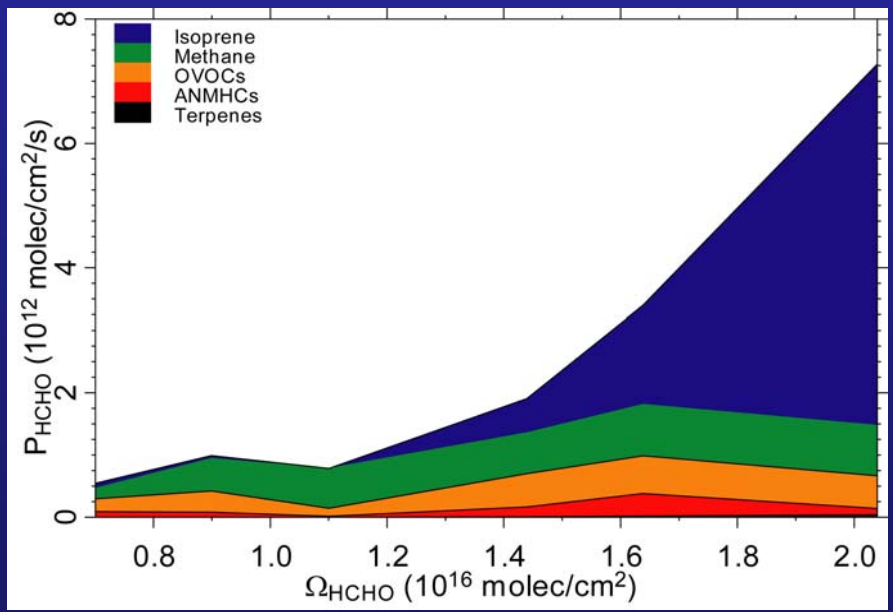
OMI HCHO Columns for June-Aug 2006



Isoprene Emissions



Millet et al., submitted



Isoprene dominant source when Ω_{HCHO} is high

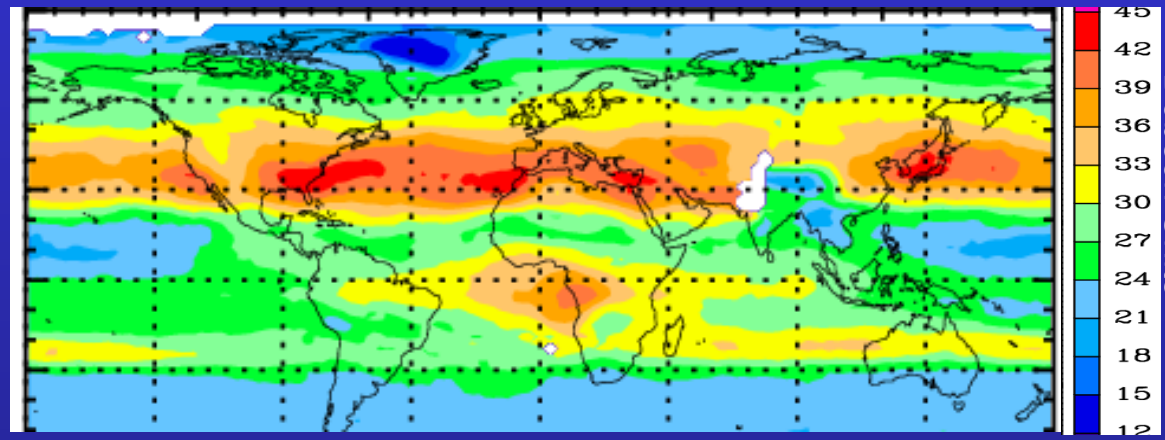
Other VOCs give rise to a relatively stable background Ω_{HCHO}
→ Not to variability detectable from space

Ω_{HCHO} variability over N. America driven by isoprene

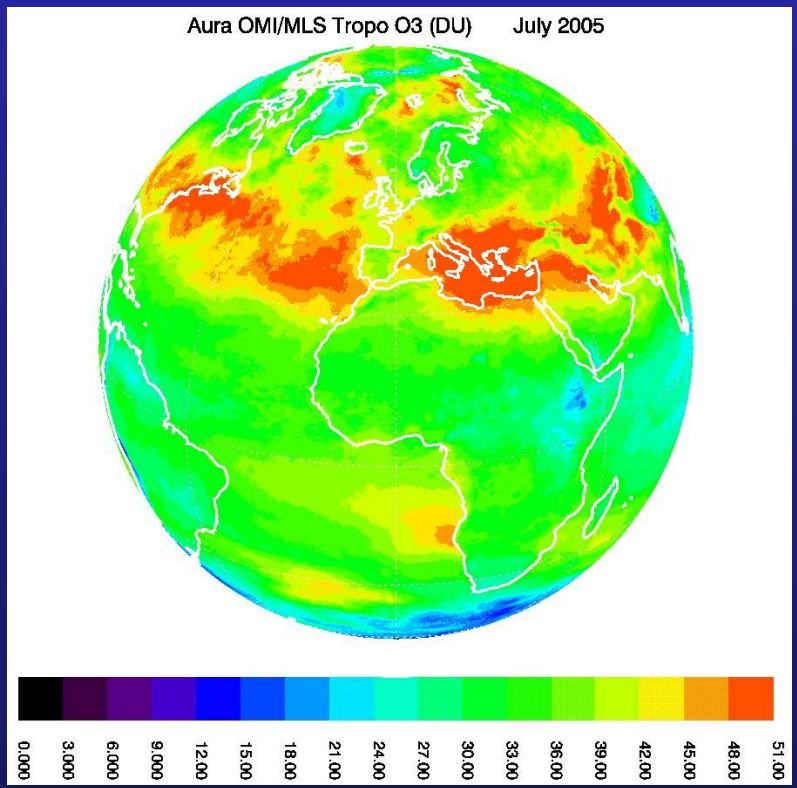
Millet et al., 2006

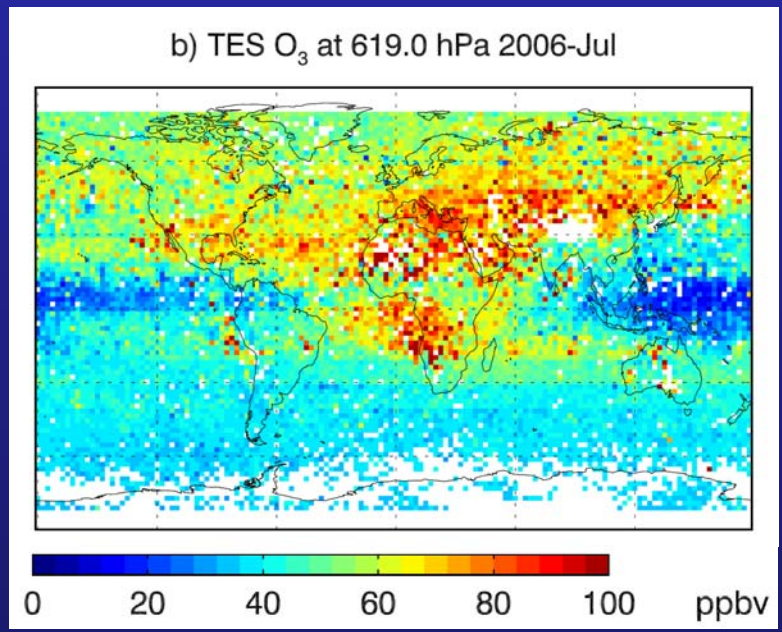
Global Retrievals of Tropospheric Ozone

Tropospheric O_3 from GOME for summer 1997
Liu et al., 2006



Ziemke et al., 2006





Nassar and TES-team, 2007